



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/072,990	02/12/2002	Nigel T. Birch	84572	3516

20736 7590 02/18/2004  
MANELLI DENISON & SELTER  
2000 M STREET NW SUITE 700  
WASHINGTON, DC 20036-3307

EXAMINER

RODRIGUEZ, WILLIAM H

ART UNIT	PAPER NUMBER
----------	--------------

3746

DATE MAILED: 02/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/072,990

Applicant(s)

BIRCH ET AL.

Examiner

William H. Rodriguez

Art Unit

3746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2 and 5-56 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 6,8-12,26,27,33,40,42,44 and 45 is/are allowed.
- 6) ☒ Claim(s) 1,2,5,7,13-15,17-21,23,25,28-32,34-39,41,43 and 46-56 is/are rejected.
- 7) ☒ Claim(s) 16,22 and 24 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

This office action is in response to the amendment and remarks filed 12/29/03. Since the examiner has applied new grounds of rejection, this office action is being made non-final to afford the applicant the opportunity to respond to the new grounds of rejection.

#### *Claim Objections*

1. Claim 21 reads, "*the electrostrictive material moves the tab from the second non-deployed position and the first deployed position*". It is believed that the word "and" should be replaced by the word --to-- before "the" and after "position". Appropriate correction is required.

Claims 45 recite the limitations "*a first deployed position; a second non-deployed position*". The word "a" should be replaced by --said-- before "first and second" in each of the last 5 lines of this claim. Notice that "a first deployed position; a second non-deployed position" were already positively recited in lines 6 and 8. Appropriate correction is required.

Claims 46 and 52 recites the limitation "the downstream periphery" in lines 2 and 3 respectively. There is insufficient antecedent basis for this limitation in the claim.

#### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this

Art Unit: 3746

subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 5, 7, 13-15, 17-21, 23, 25, 30, 41, 43, 46, 49-53 and 55 are rejected under 35 U.S.C. 102(e) as being anticipated by **Rey et al.** (U.S. Patent No. 6,318,070).

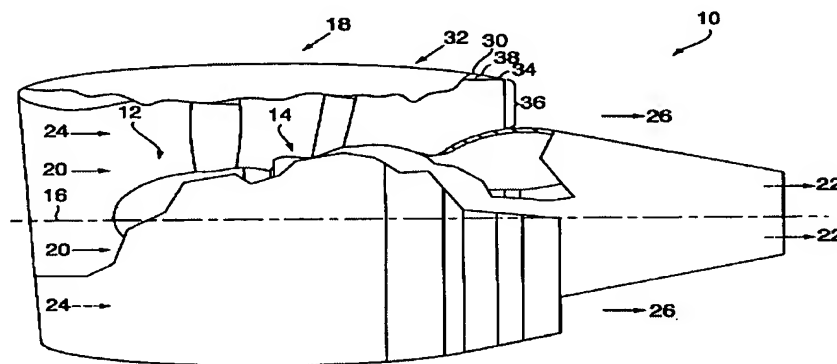


FIG. 1

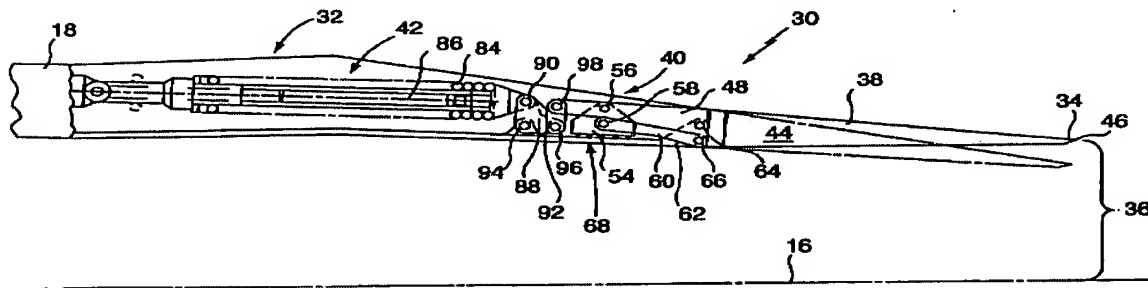


FIG. 2

With respect to claim 1, **Rey et al.** teach a gas turbine engine exhaust nozzle arrangement for the flow of exhaust gases therethrough between an upstream end and a downstream end thereof comprising a nozzle, a downstream portion and a plurality of tabs 38, each tab 38 extends in a generally axial direction from the downstream portion of the nozzle wherein the nozzle further comprises an actuation mechanism capable of moving the tabs between a first deployed position, in the first position the tabs interact with a gas stream to reduce exhaust noise thereof,

Art Unit: 3746

and a second non-deployed position, in the second position the tabs being substantially aerodynamically unobtrusive, wherein the actuation mechanism comprises a shape memory material element 68 and wherein the nozzle further comprises a radially inner part and a radially outer part, wherein the tabs are rotatably attached to the nozzle at the radially inner part, the actuation mechanism comprises the shape element mounted at a first end to a radially outer part of the nozzle and mounted at a distal end said radially outer part of the tab, such that in use, the element in a first shape maintains the tab in the second non-deployed. See particularly **Figures 1 and 2 of Rey et al.**

With respect to claim 2, **Rey et al.** teach that the plurality of tabs 38 are circumferentially disposed about the nozzle.

With respect to claim 5, **Rey et al.** teach that the periphery of the nozzle defines a pocket therein and at least a part of the element 68 is generally disposed within the pocket.

With respect to claim 7, **Rey et al.** teach a gas turbine engine exhaust nozzle arrangement for the flow of exhaust gases therethrough between an upstream end and a downstream end thereof comprising a nozzle, a downstream portion and a plurality of tabs 38, each tab 38 extends in a generally axial direction from the downstream portion of the nozzle wherein the nozzle further comprises an actuation mechanism capable 68 of moving the tabs between a first deployed position, in the first position the tabs interact with a gas stream to reduce exhaust noise thereof, and a second non-deployed position, in the second position the tabs are substantially aerodynamically unobtrusive, wherein the actuation mechanism 68 comprises a shape memory material and wherein the element is in the form of a spring. See particularly **Figures 1, 2;** and column 4 lines 46-50, column 6 lines 26-29 of Rey et al.

Art Unit: 3746

**Note:** Claim 7 recites “wherein the element is in the form of a spring” in lines 10-11. A shape memory alloy when transferring from one form to another will act like a spring “in the form of a spring”.

With respect to claim 13, **Rey et al.** teach a gas turbine engine exhaust nozzle arrangement for the flow of exhaust gases therethrough between an upstream end and a downstream end thereof comprising a nozzle, a downstream portion and a plurality of tabs 38, each tab 38 extends in a generally axial direction from the downstream portion of the nozzle wherein the nozzle further comprises an actuation mechanism capable 68 of moving the tabs between a first deployed position, in the first position the tabs interact with a gas stream to reduce exhaust noise thereof, and a second non-deployed position, in the second position the tabs are substantially aerodynamically unobtrusive, wherein the actuation mechanism 68 is actuated in a response to an applied field. See particularly **Figures 1, 2;** and column 4 lines 46-50, column 6 lines 26-29 of Rey et al.

With respect to claim 14, **Rey et al.** teach that the field is a temperature flux. See particularly column 4 lines 46-50 and column 6 lines 26-29 of Rey et al.

With respect to claim 15, **Rey et al.** teach that the field is an electric current. See particularly column 4 lines 46-50 and column 6 lines 26-29 of Rey et al.

With respect to claims 17, 18 and 23, **Rey et al.** teach that the shape memory material element 68 comprises a plurality of strands 70 forming an array 72, and each strand 70 is formed from a plurality of shaped memory alloy (SMA) wires 74. The SMA wires can be either pure nickel-titanium (NiTi) alloy, or nickel-titanium alloy modified with various other elements or

Art Unit: 3746

another material that exhibits shape memory effect. See particularly column 6 lines 56-59 of Rey et al.

With respect to claims 19-21, **Rey et al.** teach that to actuate the taps 38, the control system 81 applies heat or voltage across the SMA material to heat the SMA actuator. See particularly **Figure 6** of Rey et al.

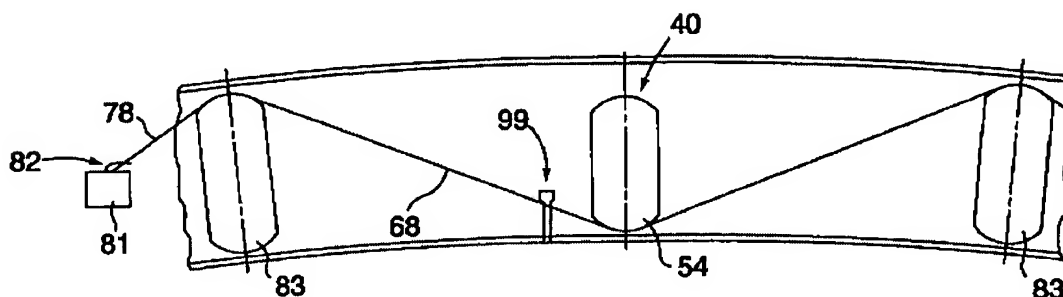


FIG. 6

With respect to claim 25, **Rey et al.** teach that the downstream portion of the nozzle comprises a downstream periphery, the plurality of circumferentially disposed tabs 38 extend in a generally downstream direction from the downstream periphery. See particularly **Figure 2** of Rey et al.

With respect to claim 30, **Rey et al.** teach that the tabs circumferentially taper in the downstream direction. See particularly **Figure 2** of Rey et al.

With respect to claims 41 and 43, **Rey et al.** teach that the taps 38 have a first shape in the deployed position and a second shape in the non-deployed position. In the deployed position, the first shape has a first length which is longer than a second length (when the tap is in the non-deployed position, second shape). See particularly **Figures 2, 3, 9 and 10** of Rey et al.

Art Unit: 3746

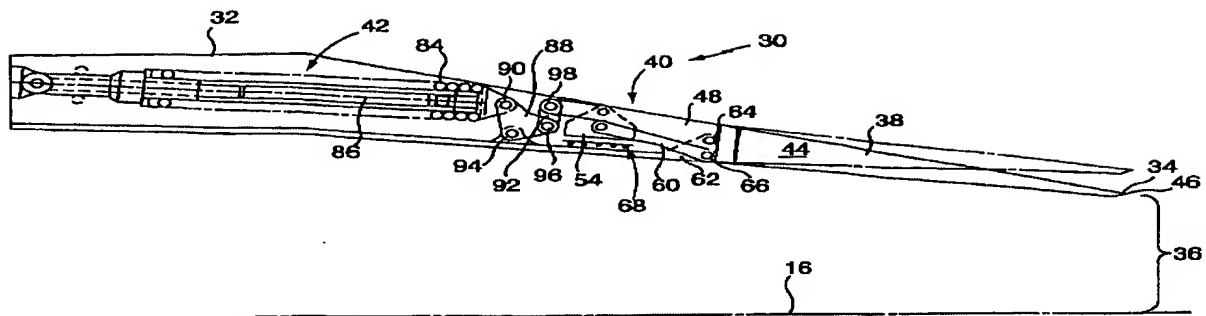


FIG. 3

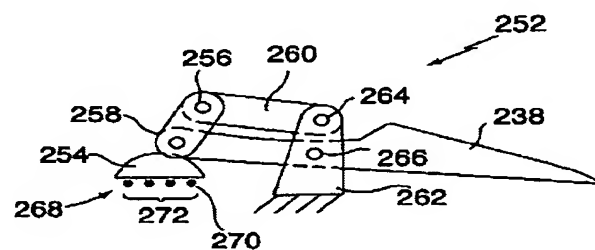


FIG. 9

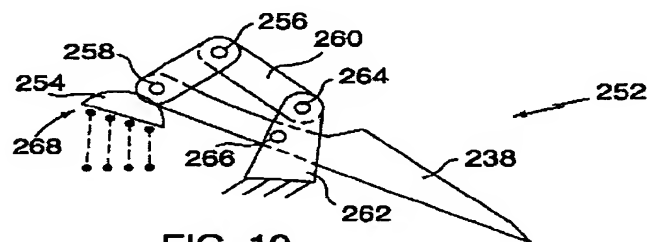


FIG. 10

With respect to claim 46, **Rey et al.** teach that the downstream periphery comprises straight edges, each straight edge having a tab disposed thereto.

With respect to claims 49 and 51, **Rey et al.** teach that exhaust nozzle arrangement is a bypass exhaust nozzle.

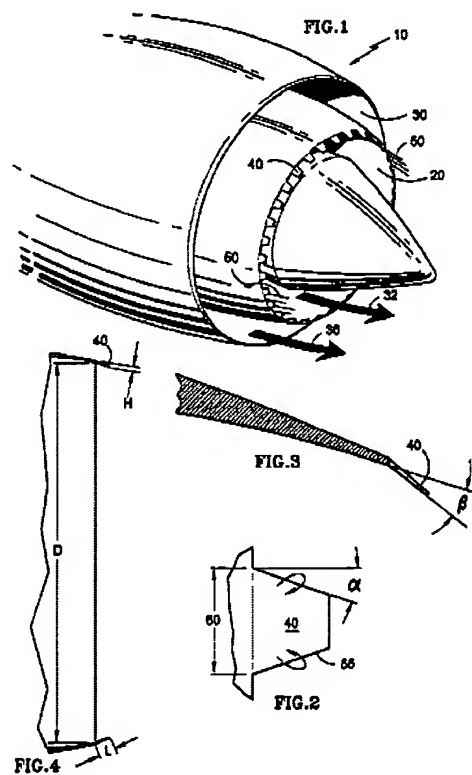
With respect to claim 50, **Rey et al.** teach that exhaust nozzle arrangement comprises a core exhaust nozzle and a bypass exhaust nozzle. See particularly **Figure 1** of **Rey et al.**

With respect to claim 52, **Rey et al.** teach that the downstream end of the bypass nozzle is further downstream than the downstream periphery of the core exhaust nozzle.

With respect to claim 53, **Rey et al.** teach that the downstream end of the bypass nozzle is upstream of the downstream periphery of the core exhaust nozzle. See particularly **Figure 1** of **Rey et al.**

With respect to claim 55, **Rey et al.** teach that the tabs extend generally in a downstream direction. See particularly **Figure 2** of **Rey et al.**

4. Claims 32 and 39 are rejected under 35 U.S.C. 102(e) as being anticipated by **Zysman et al.** (U.S. 6,487,848).



With respect to claims 32 and 39, **Zysman et al.** teach a gas turbine engine exhaust nozzle arrangement for the flow of exhaust gases therethrough between an upstream end and a downstream end thereof comprising a nozzle, a downstream portion and a plurality of tabs 40, each tab extends in a generally axial direction from the downstream portion of the nozzle wherein the nozzle further comprises an actuation mechanism capable of moving the tabs between a first deployed position, in the first position the tabs interact with a gas stream to reduce exhaust noise thereof, and a second non-deployed position, in the second position the tabs are substantially aerodynamically unobtrusive, wherein said nozzle include a nozzle wall and the tabs are radially outward angled at an angle of up to 10 or 20 degrees to the nozzle wall. Further, Zysman teaches that this angling of the taps minimizes adverse impact in terms of increase pressure drop caused by the presence of the tabs in the flow stream. See **Figure 3** and column 4 lines 29-46 of Zysman et al.

5. Claim 37 is rejected under 35 U.S.C. 102(e) as being anticipated by **Brausch et al. (U.S. 6,360,528)**.

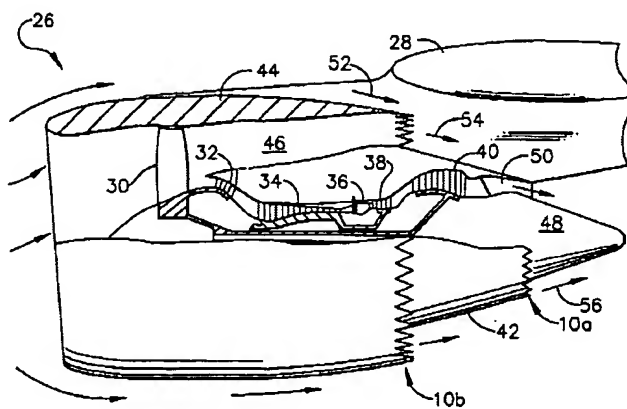


FIG. 5

**Brausch et al.** teach a gas turbine engine exhaust nozzle arrangement for the flow of exhaust gases therethrough between an upstream end and a downstream end thereof comprising a nozzle, a downstream portion and a plurality of tabs 18, each tab extends in a generally axial direction from the downstream portion of the nozzle wherein the nozzle further comprises an actuation mechanism capable of moving the tabs between a first deployed position, in the first position the tabs interact with a gas stream to reduce exhaust noise thereof, and a second non-deployed position, in the second position the tabs are substantially aerodynamically unobtrusive, wherein said nozzle include a nozzle wall and the tabs are circumferentially disposed about the periphery of the nozzle wall to define substantially V-shaped notches between adjacent tabs. See particularly **Figure 5** of Brausch et al.

6. Claims 38 and 56 are rejected under 35 U.S.C. 102(b) as being anticipated by **GB 910,250**.

With respect to claim 38, **GB '250** reference teach a gas turbine engine exhaust nozzle arrangement for the flow of exhaust gases therethrough between an upstream end and a downstream end thereof comprising a nozzle, a downstream portion and a plurality of tabs 17, each tab extends in a generally axial direction from the downstream portion of the nozzle wherein the nozzle further comprises an actuation mechanism capable of moving the tabs between a first deployed position, in the first position the tabs interact with a gas stream to reduce exhaust noise thereof, and a second non-deployed position, in the second position the tabs are substantially aerodynamically unobtrusive, wherein the edges of the tabs are curved. See particularly **Figure 2** of the GB'250 reference.

With respect to claim 56, **GB '250** reference teach a gas turbine engine exhaust nozzle arrangement for the flow of exhaust gases therethrough between an upstream end and a downstream end thereof comprising a nozzle, a downstream portion and a plurality of tabs 17, each tab extends in a generally axial direction from the downstream portion of the nozzle wherein the nozzle further comprises an actuation mechanism capable of moving the tabs between a first deployed position, in the first position the tabs interact with a gas stream to reduce exhaust noise thereof, and a second non-deployed position, in the second position the tabs are substantially aerodynamically unobtrusive, wherein the tabs extend generally in an upstream direction (tabs 17 extend towards the upstream portion of the device). See particularly **Figure 1** of the **GB'250** reference.

7. Claim 39 and 47 are rejected under 35 U.S.C. 102(b) as being anticipated by **GB 1,116,639**.

With respect to claim 39, **GB** reference **'639** teach a gas turbine engine exhaust nozzle arrangement for the flow of exhaust gases therethrough between an upstream end and a downstream end thereof comprising a nozzle, a downstream portion and a plurality of tabs 1, each tab extends in a generally axial direction from the downstream portion of the nozzle wherein the nozzle further comprises an actuation mechanism capable of moving the tabs between a first deployed position, in the first position the tabs interact with a gas stream to reduce exhaust noise thereof, and a second non-deployed position, in the second position the tabs are substantially aerodynamically unobtrusive, wherein said nozzle include a nozzle wall and the

Art Unit: 3746

tabs are radially inwardly angled at an angle of up to 10 degrees relative to the nozzle wall. See particularly **Figure 3-4** of the GB '639 reference.

With respect to claim 47, **GB** reference '639 teach a gas turbine engine exhaust nozzle arrangement for the flow of exhaust gases therethrough between an upstream end and a downstream end thereof comprising a nozzle, a downstream portion and a plurality of tabs 1, each tab extends in a generally axial direction from the downstream portion of the nozzle wherein the nozzle further comprises an actuation mechanism capable of moving the tabs between a first deployed position, in the first position the tabs interact with a gas stream to reduce exhaust noise thereof, and a second non-deployed position, in the second position the tabs are substantially aerodynamically unobtrusive, wherein the actuation mechanism further comprise and end stop, the end stop is configured to provide a positive locator for the tab in either its deployed or non-deployed positions. See particularly **Figure 3-4** of the GB '639 reference.

### *Claim Rejections - 35 USC § 103*

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Rey et al.** (U.S. Patent No. 6,318,070).

**Rey et al.** teach a gas turbine engine exhaust nozzle arrangement for the flow of exhaust gases therethrough between an upstream end and a downstream end thereof comprising a nozzle, a downstream portion and a plurality of tabs 38, each tab 38 extends in a generally axial direction from the downstream portion of the nozzle wherein the nozzle further comprises an actuation mechanism capable 68 of moving the tabs between a first deployed position, in the first position the tabs interact with a gas stream to reduce exhaust noise thereof, and a second non-deployed position, in the second position the tabs are substantially aerodynamically unobtrusive. **Rey et al.** does not teach that the tabs or the nozzle comprising a thermal barrier coating. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have coated either or both the tabs and nozzle with a thermal protective coating so as to extend the life of the components being exposed to high temperatures from the exhaust. See particularly **Figures 1, 2;** and column 4 lines 46-50, column 6 lines 26-29 of **Rey et al.**

10. Claims 31, 34, 35, 36, 48 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Rey et al. (U.S. Patent No. 6,318,070)** in view of **Zysman et al. (U.S. 6,487,848)**.

With respect to claim 31, **Rey et al.** teach that the tabs 38 are radially inwardly angled at an angle relative to the nozzle wall. However, **Rey et al.** is silent about the angle being of up to 20 degrees relative to the nozzle wall. Nevertheless, **Zysman** teaches a gas turbine engine exhaust nozzle having a plurality of tabs radially inwardly angled at an angle of up to 20 degrees. Further, **Zysman** teaches that this angling of the tabs minimizes adverse impact in terms of increase pressure drop caused by the presence of the tabs in the flow stream. Therefore it would

Art Unit: 3746

have been obvious to one of ordinary skill in the art at the time the invention was made to have Rey's tabs not to exceed an angle of 20 degrees as taught by Zysman in order to avoid an increase in pressure drop caused by the presence of the tabs in the flow stream which would reduce the efficiency of the engine. See **Figure 3** and column 4 lines 29-46 of Zysman et al.

With respect to claims 34, 35 and 36, **Zysman et al.** teach that the taps are of a substantially trapezoidal shape, said tabs being circumferentially disposed about the periphery of the nozzle wall to define substantially trapezoidal shaped notches between adjacent tabs. See particularly **Figure 1** and column 5 lines 19-59 of Zysman et al.

With respect to claims 48 and 54, Rey et al. schematically show that the exhaust nozzle is used as a bypass exhaust nozzle, but does not mention that the exhaust nozzle can be used as a core engine nozzle. However, **Zysman et al.** teaches that for a gas turbine engine placing the gas turbine exhaust nozzle at either the core engine nozzle or the bypass exhaust nozzle has the same utility as a noise suppressor. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used Rey's bypass nozzle as a core engine exhaust nozzle as taught by Zysman since at either location the exhaust nozzle has the same utility as a noise suppressor. See particularly column 6 lines 8-19 of Zysman et al.

***Allowable Subject Matter***

11. Claims 6, 8, 9, 10, 26, 33, 40, 42, 44 and 45 were previously objected as being allowable if rewritten in independent form including all the limitation of the base claim. Applicant has done this and thus these claims and its dependent claims are allowed.

Art Unit: 3746

The indicated allowability of claim 7 is withdrawn for the following reasons: Claim 7 recites "wherein the element is in the form of a spring" in lines 10-11. A shape memory alloy when transferring from one form to another will act like a spring. While the examiner recognizes the difference between the **Rey et al.** reference and the instant invention, the reference nonetheless reads on the claimed invention. Thus, examiner suggests changing the phrase "the element is in the form of a spring" to --the element is a spring --. If this change is made to independent claim 7, the examiner would favorably consider the case for allowance upon a further search.

Claims 16, 22 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The indicated allowability of claims 4, 28, 29, 32, 37, 38, 39, 47 and 56 is withdrawn in view of the newly discovered reference(s) to GB'639, GB'250, Zysman et al. and Brausch et al. See rejections above.

#### ***Response to Arguments***

13. Applicant's arguments with respect to claims 4, 7, 28, 29, 31, 32, 37, 38, 39, 47, 56 have been considered but are moot in view of the new ground(s) of rejection.

14. Claim 1 and 13 were previously rejected in the office action sent on 6/25/03 by the Rey et al. reference. In the amendment submitted by applicant on 12/29/03 applicant combine the subject matter of rejected claim 1 into rejected claim 13. Thus the combination of claims 1/13 is not allowed and the rejection by Rey et al. is still applicable.

Art Unit: 3746

***Contact information***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to William H. Rodriguez whose telephone number is 703-605-1140.

The examiner can normally be reached on Monday-Friday 7:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Justine R Yu can be reached on 703-308-2675. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0861.

W.R  
February 9, 2004

  
**JUSTINE YU**  
**SUPERVISORY PATENT EXAMINER**  
2/12/04